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Asking the Age Question in Elderly Populations: A Reverse Record Check Study

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In two large-scale surveys among elderly respondents we evaluated the accuracy of answers obtained to three differently formulated age questions. Respondents included 6,149 individuals aged 65-86 living in The Netherlands. Because criterion age data were available from different sources, it was possible to compare the respondent's reported age with his or her actual age. Refusal rates were low for all three questions. Both age and cognitive capabilities influenced accuracy of the answers to the age questions. The results indicated that the most accurate data were obtained with the question, "What is your date of birth?" in combination with interview date.

THE age question is probably the most frequently asked question in surveys among the elderly population. The variable age of the respondent has a function of some sort in almost all analyses. Despite the wide utilization of the variable age, only a few empirical studies have investigated the accuracy of answers to the age question in relation to the formulation of the question (Kerin & Peterson, 1978; Myers, 1954; Peterson, 1984; Weaver & Swanson, 1974). Age effects on accuracy of answers to differently formulated age questions were not found, but none of these studies was specifically aimed at elderly populations.

Among elderly respondents inaccuracy may be expected to increase as a function of the variable one is trying to measure, the age of the respondent. The accuracy of the answer is associated with cognitive capabilities, which tend to decline with increasing age. A number of well-established tests for measuring the cognitive capabilities of elderly persons even use the incorrectness of the answers to the age question as an indicator for the decline of these capabilities (Pfeiffer, 1975; Roth, Huppert, Tym, & Mountjoy, 1988). It is therefore to be expected that in elderly respondents the chances of reporting an inaccurate answer increase with age due to cognitive decline. However, the relationship between the accuracy of answers to differently formulated age questions and cognitive decline has not been addressed.

For researchers who use self-reported survey data, a dilemma arises. To analyze research questions related to age, an accurate answer on the age question is necessary. To minimize measurement error on the age question, one should know which formulation results in the most accurate answer in an elderly population. Therefore, we investigated in two large studies among elders to what extent respondents answered accurately to three differently formulated age questions. Next we investigated to what extent cognitive capabilities affected the accuracy of the answer to those questions.

Methods

Sample 1. — The Amsterdam Study on the Elderly (Amstel) is a population study on cognitive decline and psychogeriatric pathology in community-dwelling elderly persons between 65 and 86 years of age. Respondents were recruited from 30 general medical practices throughout Amsterdam. A total of 5,666 elderly persons was sampled: 4,051 (71.5%) responded, 1,357 (23.9%) refused, and 258 (4.6%) were unavailable for interview for reasons such as death, institutionalization, or because they had left Amsterdam. In a substudy of nonresponse patterns we found that 80- to 84-year-olds had a lower response rate than other individuals (68% vs 72.9%; $p < .0004$) (Launer, Wind, & Deeg, 1994).

The respondents were asked (1) "What is your date of birth? (day-month-year)" and (2) "How old are you?" Validating information on respondents' date of birth was obtained from files of the respondents' family doctor or medical health insurance companies.

Sample 2. — The Longitudinal Aging Study Amsterdam (LASA) is an interdisciplinary, longitudinal study across a period of at least 10 years. LASA is concerned with predictors and consequences of change of autonomy and well-being in the aging population. A random sample stratified by year of birth, sex, and expected mortality at midterm (= after 5 years) in six age groups (ages 55–59, 60–64, 65–69, 70–74, 75–79, 80–84) was drawn from 11 population registries of municipalities from 3 different areas in The Netherlands. For LASA a total of 3,805 persons were approached, of whom 3,107 (81.7%) took part. A number of people, 394 (10.4%), refused to participate due to lack of interest; 134 (3.5%) were too ill or too cognitively impaired to be interviewed; 126 (3.3%) died before being interviewed, and 44 (1.2%) persons could not be contacted. Nonresponse was related to age ($p < .001$) but not to sex. As expected, the older-old were more often found to be too ill or cognitively impaired to participate ($p < .05$) (Smit & de Vries, 1994). In the survey, the question "What age did you reach at your last birthday?" was asked. Validating information on date of birth was obtained from the population registries of the respondents' municipalities. For the present study only respondents 65 years and older were included ($N = 2143$).

Both studies are described in detail elsewhere (Sample 1: Launer, Dinkgreve, Jonker, Hooijer, & Lindeboom, 1993; Sample 2: Deeg & Westendorp-de Serière, 1994). In both studies the Mini-Mental Health State Examination (MMSE) of Folstein, Folstein, and McHugh (1975) was administered as a test of the cognitive capabilities of respondents. The MMSE scores-range from 0 (low capacity) to 30 (high capacity). Before analyses both age and MMSE were recoded to four strata (age: 65–69, 70–74, 75–79, 80–86; MMSE: 0–16, 17–22, 23–25, 26–30). These MMSE categories represent clearly distinguishable clinical categories (Thombaugh & McIntyre, 1992). Furthermore, the exact date of the interview was registered in both studies. All interviews were audiotaped. When discrepancies were found between reported age of respondents and age from records, both were checked to maximize validity. When discrepancies occurred, the answers on tape were checked to make sure there was no data entry error by the interviewer. Also, the official record was checked again to avoid administrative errors.

To establish which formulation gave the best results on the age question, frequency distributions of answers in Sample 1 were analyzed with a likelihood-ratio test. Subsequently, a one-sided binomial test was used to determine whether the frequency distribution of the question with the most accurate answers in Sample 1 was more accurate than the frequency distribution of the age question in Sample 2. The effects of age and cognitive capabilities on the correctness of answers to the three age questions were estimated in the two samples by means of logistic regression.

Results

In Table 1 an overview on the accuracy of answers to the three age questions is given for different age and MMSE strata.

For all three questions nonresponse was low (0.4, 0.4, and 0.1%, respectively). Analyses of item nonresponse in Sample 1 indicated that the same respondents refused to answer both age questions, which suggests that the topic of the question was a more important factor than the formulation of the question.

The likelihood-ratio test within Sample 1 showed that the most accurate answers were obtained with question Q1, "What is your date of birth?" Results are shown in Table 2. The comparison between Q1 "What is your date of birth?" from Sample 1 with Q3 "What age did you reach at your last birthday?" from Sample 2 by means of a (one-sided) binomial test resulted in a significant difference between both distributions ($p = .006$) in favor of question Q1 "What is your date of birth?"

In both samples, age as well as cognitive capabilities were risk factors in reporting an incorrect age. Older respondents were less accurate in reporting their correct age. As cognitive capabilities were poorer, accuracy in reporting the correct age also declined. Compared with age, cognitive capabilities were a much stronger predictor for mistakes on the age questions. When both age and cognitive capabilities were entered in one model, the effect of age was no longer significant. A summary of the results of the logistic regression analysis is shown in Table 3.

Discussion

Analysis of the answers to differently formulated age questions in two large-scale surveys among the elderly indicated that accuracy on the question "What is your date of birth?" was highest, while item nonresponse was low for all three questions. Both age and cognitive capabilities affected the accuracy of answering the age question. However, the effect of cognitive capabilities was much greater than the effect of age.

The finding that "What is your date of birth?" is the best question may be understood by considering that the age of respondents is changing every year, whereas date of birth is

Table 1. Correctness of Answers to Three Age Questions

	(Q1) What Is Your Date of Birth? (Day-Month-Year)		(Q2) How Old Are You?		(Q3)What Age Did You Reach at Your Last Birthday?	
	% Correct	*N*	% Correct	*N*	% Correct	*N*
Age Category						
65–69	99.4	831	99.0	831	99.4	500
70–74	99.4	974	99.0	974	98.7	469
75–79	99.2	1235	97.9	1235	98.1	578
80–86	97.7	993	96.7	993	97.6	591
MMSE Category[a]						
0–16	79.3	82	62.2	82	80.4	51
17–22	93.3	209	90.0	209	97.0	167
23–25	99.4	462	98.3	462	97.0	372
26–30	99.7	3280	99.5	3280	99.6	1531
N respondents	4033		4033		2138	
% Respondents reporting correct age	98.9		98.1		98.4	
% Refusals	0.4 ($n = 18$)		0.4 ($n = 18$)		0.1 ($n = 3$)	

[a]Due to test nonresponse on the MMSE, the total *N* varies slightly between age and MMSE categories.

Table 2. Response Distributions for Two Differently Formulated Age Questions in Sample 1

	How Old Are You? (Q2)		
	Correct	Incorrect	Total
What is your date of birth? (Q1)			
Correct	3930	59	3989
Incorrect	26	18	44
Total	3956	77	4033

Note: Likelihood-ratio 88.24, df = 1, $p < .001$.

Table 3. Association of Age and MMSE with Correctness of Differently Formulated Age Questions

		p-value	Exp (B)
What is your date of birth? (day-month-year)			
Model 1	Age	.006	1.743
Model 2	MMSE	.000	0.215
Model 3	Age	.146	1.272
	MMSE	.000	0.222
How old are you?			
Model 1	Age	.001	1.620
Model 2	MMSE	.000	0.201
Model 3	Age	.188	1.181
	MMSE	.000	0.206
What age did you reach at your last birthday?			
Model 1	Age	.016	1.501
Model 2	MMSE	.000	0.291
Model 3	Age	.958	0.990
	MMSE	.000	0.290

Note: Logistic regression analyses: Model 1 Age; Model 2 MMSE; Model 3 Age and MMSE.

constant. Imprinting this datum in memory, recalling it, and restoring it has occurred throughout life. Chances of remembering the correct date of birth are therefore high even when cognitive capabilities are declining. Previous research has shown that in general there is no clear evidence that factual information is reported less validly by older respondents, although in particular their reports on chronological age may be less accurate (Herzog & Dielman, 1985; Rodgers & Herzog, 1987). Our results shed a new light on this validity question by indicating clearly that it is not sufficient to study response accuracy of factual survey questions solely in relation with age. Accuracy appears to be better studied as a function of cognitive capabilities in combination with age.

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